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THE APPLICATION OF THE PHYSIOLOGICAL PRINCIPLE TO TENDON TRANSPLANTATIONS.

LEO MAYER, A. M., M. D.,
NEW YORK CITY.

It is a surprising fact that despite the hundreds of tendon transplantations performed each year certain anatomical and physiological facts essential to their rational execution have received little or no attention. For instance, one of the most important requisites for a successful operation is that the transplanted tendon shall glide freely, yet the laws governing the gliding mechanism of tendons have not been investigated. Again, in suturing a tendon, the surgeon should naturally attempt to restore the normal tension, yet, until recently, no one had attempted to discover what the normal tension is. Search the text-books of physiology and scarcely a word will be found about tendons, yet they are mechanically as important as the bones or muscles about which thick chapters have been written. In the medical literature, too, tendons have been slighted. Heinecke, Hartmann, Lovell and Tanner, Lunghetti, and Seemann, have helped to elucidate their anatomy, but no one, so far as I have discovered, published anything about their physiology until Stoffel, in 1914, presented a paper before the German Orthopedic Association dealing with the tension of tendons. His conclusions were of peculiar interest to me since, despite the difference between his method of investigation and mine, our results agreed accurately.

I first became interested in tendons in 1912 when, during a service under Prof. Lange in Munich, I began studying them with Dr. Carl Henze of New Haven. Prof. Lange gave us as the specific research problem the prevention of post-operative adhesions. In a series of animal experiments, we tested successively various substances,—vaseline, Cargile membrane, etc., in their effect upon adhesions. Finally we followed the suggestion of Biesalski and utilized the sheath of one tendon as the pathway for the transplanted tendon. This method gave such excellent results that I decided to follow up the physiological principle involved, namely, the coordination of the operative technic with the normal anatomy and physiology. To do this, however, extensive research was a necessary preliminary.

The first question I attempted to answer was, "how do tendons glide?" I found that the tendon sheath was merely one element in the gliding mechanism, and that the range of motion of the tendon above its sheath was fully as great as within the sheath. The sheath acted merely as a fluid buffer so situated as to lessen friction when the tendon turned a corner. Only those tendons were provided with sheaths whose course was marked at some point by a change of direction. The Achilles tendon, for example, possesses no true sheath, despite frequent references to such a structure in the surgical literature, and the term, "tendo-vaginitis," when applied to the Achilles tendon, is a misnomer. The Achilles tendon pursues practically a straight course and is surrounded by a fascial envelope simulating a sheath, but differing from it radically in structure, since the tendon sheath, like a joint, is characterized by a synovial-lined cavity containing a serous fluid. The motion of the tendon, where a sheath is not present, is made possible by a loose areolar tissue, the paratenon, rich in elastic fibers, which possesses sufficient elasticity to permit 4 to 8 cm. of motion without tearing. Within the sheath this tissue is continuous with a membrane of similar structure, known as the mesotenon, through which the tendons derive their vascular supply. It is self-evident that at the upper and lower portal of the sheath a definite mechanism must be present which closes off its cavity and at the same time allows the tendon to move to and fro. The tendon may roughly be compared in this connection with the piston of a steam engine whose cylinder is analogous to the sheath. The essential difference between the engine and the tendon mechanism is that there is no connection between the piston and the cylinder, whereas the sheath is directly attached to the tendon at its entry and at its exit. Study on the cadaver, observation during operations on human beings, and animal experiments, reveal the presence of a delicate fold of loose connective tissue prolonged downward as a kind of tongue into the sheath. This structure (the plica), by virtue of its elasticity, can follow the movements of the tendon and at the same time wall off the cavity of the sheath. In many instances it shows a kind of in-

vagination during the phase of muscular contraction. (See Fig. 1.) In other cases the microscopical picture indicates merely a stretching or a contraction of its fibers. As an illustration of how the changes in the form of this structure were studied, I may quote one experiment. Under anesthesia the tibialis anticus of a dog was stimulated with a faradic current, and while the muscles' cells were in a condition of maximal contraction, the limb was plunged into formaline and kept there until the muscles, still stimulated by the faradic current, had become fixed. On the opposite leg the gastrocnemius was faradized in similar fashion so as to produce a relaxation of the tibialis anticus. Thus, on

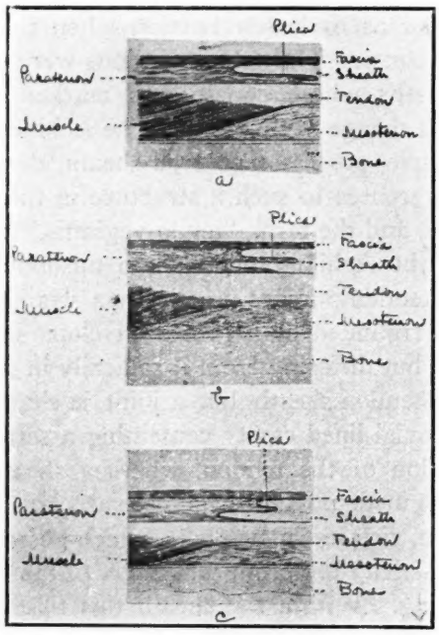

Fig. I. Changes in the form of the sheath during contraction of the muscle.
A. The upper pole of the sheath when the muscle is completely relaxed.
B. The muscle has partly contracted. Note that the two pockets of the sheath formed by the plica are now almost equally long.
C. The muscle has reached the maximal contraction. Note that the deep pocket of the sheath between the tendon and the plica has now become longer than the superficial pocket.

one side the tendon was drawn upward by the contraction of the anterior tibial muscle, on the other side downward by its opponent. The sheath and tendon were then excised, hardened in formaline, and serial sections were prepared. By comparison of corresponding sections during the phases of muscular contraction and relaxation, the mechanism of the sheath and the related structures could be determined. (See Fig. 2.) All observations on the gliding of tendons illustrated the importance of the loose connective tissue surrounding them, which must therefore be treated with the greatest respect in all operations.

As a result of this first portion of the research it was possible to formulate certain operative rules which, when tested clinically, verified the experimental deductions. First, the operator should, wherever possible, utilize the sheath of the paralyzed tendon as a pathway for the transplanted tendon, since the sheath has a distinct purpose to serve for which it is peculiarly adapted. Assume that the tibialis anticus muscle is paralyzed and that the extensor hallucis proprius is to be transplanted in its stead. The tibial tendon is equipped with a sheath to prevent friction against the crucial ligament of the ankle. It is therefore a rational physiological procedure to make the substituting extensor hallucis tendon pursue a similar course. The technic for the procedure is exceedingly simple as soon as the operator knows the anatomy of the structures involved. In its neatness of execution and in its application of physiological principles to surgical technic it must appeal to the surgeon far more than the crude method of boring a subcutaneous channel now generally in vogue.

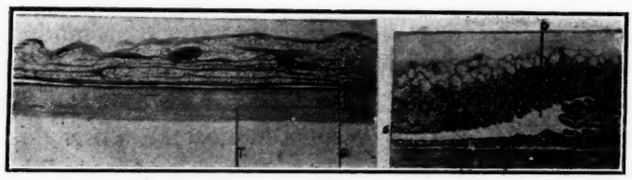

Fig. II. The lower pole of the tibialis anticus sheath of a dog.
A. During the phase of muscular relaxation.
B. During the phase of muscular contraction.
T.—tendon.
D.—lower pole of the sheath.
P.—the plica.
Note that during contraction of the muscle the tendon, in gliding upward, draws with it the plica, and that the wall of the tendon sheath accommodates itself to the motion of the tendon by numerous folds of the synovial membrane.

A second lesson derived from the study of the gliding mechanism of tendons concerns the course of the tendon from its original site to the sheath of the paralyzed tendon. If normally the tendon throughout its course is invested with loose gliding tissue, then when transplanted, the operator must see to it that similar conditions are maintained. In the instance above cited of the transfer of the extensor hallucis proprius for the tibialis anticus this rule has no particular significance, since the two tendons lie next to each other, separated only by a partition which at one point is so thin as to be transparent. This is, of course, the site of election for the transfer. In the operative transfer of the peroneus longus for the tibialis anticus, however, the principle is of great significance, since these two tendons lie in distinct fascial compartments separated from one another by a dense septum. To bore a hole through this septum would be contrary to the physiological principle and would almost to a certainty give rise to adhesions which would prevent gliding of the tendon. According to the new technic, the difficulty can be avoided. The

deep surface of the fascial compartment is coated with areolar tissue, the paratenon, adapted to the gliding of the tendon. By cutting a kind of trap door (Fig. 3) in the fascia, flaps can be reflected in such a way as to expose this deep surface and utilize it as a bed for the transplanted peroneal tendon. For the details of the operation the reader is referred to the monograph "Die Physiologische Sehnen Verpflanzung, Biesalski and Mayer (Paul Hoeber, New York") or to *Surgery, Gynecology and Obstetrics,* March, 1916.

Despite adherence to these two rules the tendon operation will probably not be successful if the post-operative period of immobilization is continued too

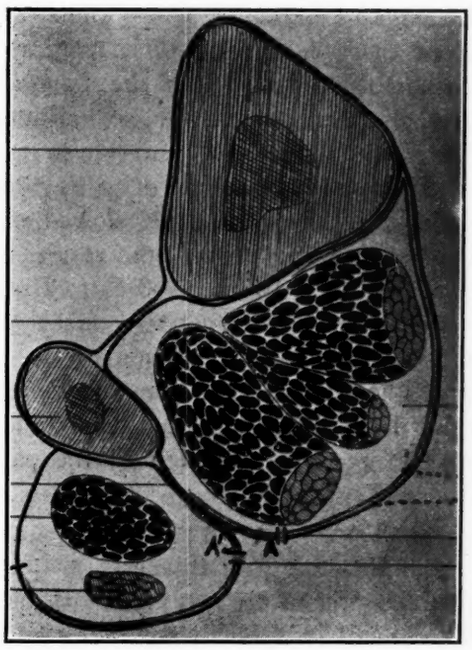

Fig. III. Diagrammatic cross section of the calf showing the anterior and lateral muscular compartments, and illustrating the principle of the fascial plastic by which the peroneus longus tendon can be transferred from its compartment to the anterior.

long, since the trauma incidental to an operation, however carefully performed, causes slight adhesions which with time will become sufficiently strong to hinder gliding. It is therefore necessary to begin early function of the transplanted tendon so as to stretch these adhesions while they are still friable. How can this be done without tearing away the tendon from its new point of insertion? Here again anatomical and physiological study gave the key to the situation. The operator must try to imitate the normal insertion of the tendon. He must not prolong the tendon silk or catgut, nor should he, except in unusual instances, attach it to another tendon. He must implant it directly into the bone in such a way that its fibers will become moored to the osseous structure. This can be done by traumatizing the periosteum and implanting the tendon between it and the bone. (See Fig. 4.) To hold the tendon securely in this position a special fixation suture was devised. (Fig 5.) This suture can withstand double the traction which the muscle can exert. It gives mechanical security until the physiological security gained by the implantation into the bone has occurred. That this actually occurred was conclusively shown in eight animal experiments, and in five secondary operations. In all instances, even when the transplanted muscle was exercised on the third day subsequent to the operation, the tendon remained firmly anchored.

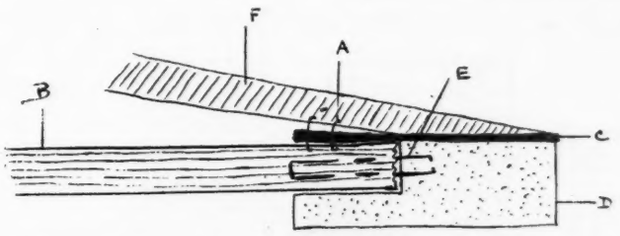

Fig. IV. Diagram illustrating the physiological method of anchoring the transplanted tendon to the bone.
A. The paralyzed tendon.
B. The transplanted tendon.
C. The traumatized periosteum.
D. Bone.
E. Fixation suture.
F. Tendon sutures.

In practice a two or three weeks' period of immobilization was found to give the best results. In case the patient is too young to exercise the muscle voluntarily, it should be stimulated by the electric current. Early exercise of the transplanted tendon does not imply straining it. On the contrary, it must be carefully guarded by a splint or brace for at least one year, or until it is strong enough to assume the function of the paralyzed muscle.

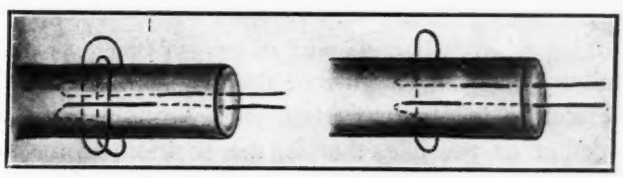

Fig. V. The fixation suture.
A. The single stitch.
B. The double stitch.

The second important physiological problem associated with tendons which I attempted to answer was the determination of their tension. It is clear that the tendon, in transmitting the traction of the contracting muscle to the skeleton, acts in much the same way as the rope of a derrick and must therefore be under a certain degree of tension. To determine how great this is I performed the following experiment on dogs: Under anesthesia a tendon was exposed and divided two centimeters above its insertion. The upper or proximal end was then threaded with stout silk able to stand a traction of ten kilos and the ends of the silk were attached

to the hook of a spring balance (Fig. 6) which recorded the traction from 25 grams to ten kilos. Manual traction was then exerted on the proximal stump until it had been drawn down to the distal. Under the varying conditions of muscular contraction and relaxation the tension necessary to approximate the two tendon ends could then be read off. When the muscle was made to contract by electrical stimulation, the degree of tension varied according to the size of the muscle and the strength of the electrical reaction. When the muscle was at rest, however, the tension was found to be a constant quantity, reducible to a simple formula: With

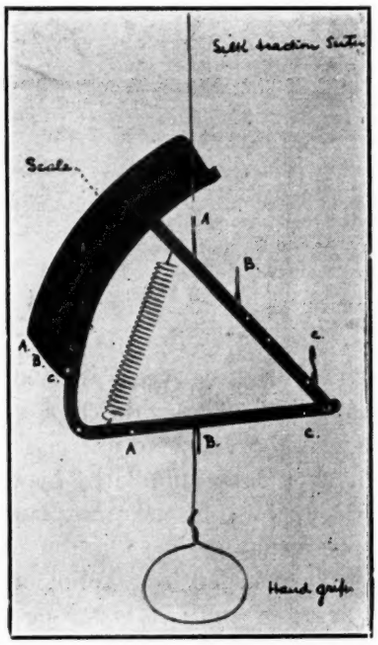

Fig. VI. The spring balance used in determining the tension of tendons. By varying the position of the hand-grip and of the traction suture, the tension could be registered from 25 grams to 10 kilos.

the extremity so placed that the origin of the muscle and its point of insertion were brought as near together as possible, that is, the position of maximum muscular relaxation, the tension of the tendon was zero. This fact enables the operator to formulate a practical rule: To suture the tendon under normal tension, hold the limb in such a position that the origin of the muscle whose tendon is to be transplanted and the new point of insertion of this tendon are approximated as nearly as possible, and pull upon the tendon with just enough force to render its course a straight one. In the case of the peroneus longus transplanted for the tibialis anticus the foot should be held dorsi-flexed, supinated and adducted, and when in this position the tendon should be sutured to the point of insertion of the tibialis anticus with zero tension. Then the operator can be assured that no undue strain is placed upon the structures involved. Of course the tendon must not be allowed to pursue a roundabout course, nor should the tension sink below zero by allowing any slack. This would be fully as bad a mistake as sewing under too great tension.

By applying the physiological principle to tendon transplantations a method has been devised by means of which the transplanted tendon can glide freely, is firmly anchored at its new point of insertion, and is sutured under normal tension. Knowledge of the vascular supply of tendons, of the level and thickness of fascial planes, of the exact length of the individual tendons, enables the operator to perfect his technic to a nicety. The indications for tendon transplantations require an accurate knowledge of muscular action and the proper selection of cases calls for a keen critical sense. If more than three tendons of the foot are paralyzed a tendon transplantation is seldom indicated. Then the surgeon must have recourse to other measures such as arthrodesis or astragalectomy. If the indications are carefully followed, and the operations carefully performed, the results are extremely satisfactory. In over 250 cases I observed in only one instance post-operative adhesions, and they were due to a direct violation of the physiological principle. In all other cases the transplanted tendon glided with almost the normal freedom and accurately assumed the function of the paralyzed muscle.

SUBSCAPULAR BURSITIS.

A common source of errors in diagnosis, and consequent treatment, are the inflammatory conditions in the bursæ located around the shoulder girdle, causing cervical and shoulder pain. This pain is often radiated down the arm and treated for neuritis or rheumatism. Subscapular bursitis is found in the round shoulder type in both the well nourished and the thin. The scapulæ have grown too curved during childhood from the forward position of the shoulders and are often bent enough, so that the superior angle is hooked forward. This rubs back and forth over the chest wall, producing more or less thickening of the bursa. Under occupational strain, infection, or toxic irritation, the bursa becomes inflamed and is made worse by all movements of the shoulder. To elicit the painful spots, stand behind the patient, place your hands over the shoulders with thumbs pressed over the upper, inner angles of the scapulæ. Have the patient shrug the shoulders up and down, and forward and backward; a decided crepitation is felt and pressure at this point will often elicit extreme tenderness and pain.—C. L. LOWMAN in *Medicine and Surgery.*

THE PREVENTION OF POSTANESTHETIC ACIDOSIS.*

WILLIAM LEE SECOR, A. M., M. D., F. A. C. S.
CAPTAIN, MEDICAL RESERVE CORPS, U. S. A.
Kerrville Hospital-on-the Guadalupe, Texas.

Surgical technic is rapidly becoming standardized. Practically all of our operating surgeons are now following closely along the same lines and vary their technic only in minor details. The great leaders in operative surgery have demonstrated in their large and varied clinics the best way of performing the standard operations in order to secure the most perfect results. While there will continually be improvements and refinements in the details of surgical technic, it is not in the realm of technic that we should look for great advances in a few years.

It is in hospital efficiency, the preoperative and postoperative care of patients, safety in anesthesia and prevention of shock, that we may expect to see marked improvements in the near future.

The modern hospital has passed through a slow evolution from an improvised structure with ignorant and inefficient attendants to a carefully planned and scientifically equipped institution with well-trained nurses.

It is a fact, however, that there are still too many hospitals that are really nothing more nor less than hotels with nurses of various degrees of training as attendants and a staff of physicians who pop in and out as a part of their daily rounds in a busy general practice.

How often have we seen, even in some of our largest cities, surgical cases entered in the hospital, rushed through a mere form of an examination, operated on and sent back to bed and left to the mercy of a cadet nurse and a recently graduated house physician. Too often does the interest of the surgeon end at the operating table. There is a certain fascination about operative work that attracts and holds the interest of the majority of physicians, but the study of preoperative and postoperative conditions is rather a humdrum ordeal.

Nevertheless it is the careful, painstaking diagnosis, preoperative treatment and postoperative care that determine the end-results just as much, if not more, than the actual technic used in the operation.

In the modern rush of business there is a great tendency to do superficial work; quality is being sacrificed for quantity, and the same is true in medicine. We so often try to do so much that we can't do any of our work as we know it really should be done, for the price of perfect end-results in surgery is the constant, painstaking study of our cases.

In very many elective operations, if the patient can be at the hospital for a few days prior to the operation, much can be done to reduce the operative risk and insure a smooth convalescence.

Many patients come to the hospital who have been greatly weakened and their vital resistance lowered by malnutrition due to gastric or intestinal ulcer; by hemorrhage due to uterine fibroids, bleeding piles, etc., by fever due to malaria or some focal infection or by long-continued pain. Then, too, if we add to the handicap of weakness and low vitality, the fear that is almost always, to some extent at least, felt by a patient entering a hospital, there is little wonder that surgical shock is common in some institutions. If these patients could have proper preoperative treatment they could be improved both physically and mentally, and it would change their prospects very materially.

Profound anesthesia is about as near death as one cares to get; the period of recovery from this state and the first few days following a major operation, when a hundred and one complications of varying degrees of severity may arise, requires the attention of a master and not a tyro. The day has passed when an anesthetic should be given by anyone without special training.

The mooted question of the nurse anesthetist is far from settled, and while in our work we employ both a physician and a nurse to give their entire attention to the administration of the anesthetic, it seems to us that a nurse who has had special training in this particular field ought to be able to give a safer, smoother anesthetic than the family physician who has had no special training or practice.

The best end-results in surgery will be obtained by the man who has absolute control of the department in the hospital at which he works and who spends much time at the hospital studying his cases and devising ways and means of preventing even minor complications and of making more comfortable and complete, the convalescence of his patients.

During the past six years we have been paying special attention, in our hospital work at Kerrville, to pre and postoperative treatment, and have found that there are many little things that can be done that will make the patient's stay at the hospital more pleasant and insure better end-results. It is one of these little things to which we desire to direct your attention for a few moments to-night.

Every surgeon of experience has learned to instinctively estimate the qualities of each operative case and to make a mental note of the risk. We all know that the better the condition of the patient the better will be the risk. A patient who is poorly

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*Read before the Bexar County Medical Society, San Antonio, Texas, June 14, 1917.

nourished or who has been underfed for some time will not have the vital resistance that the well nourished full-fed patient will have. Such a patient would be much more subject to shock and more liable to show the toxic effect of the anesthetic.

There are many patients whose nutrition prior to entering the hospital has been neglected and who, on account of vomiting, are without food for sometime following the operation. These cases also are more subject to delayed shock and a prolonged convalescence.

Starvation adds to the acidity of the organism, which Crile says acts as a direct injury to the cells of the nervous system. Acid intoxication is found to occur to some extent after about fifty per cent. of anesthesias. This acid intoxication or acidosis, as it is called, is a condition and not a definite pathological process, the characteristic features of which are excretion of acetone bodies in urine and breath and a marked increase in the tritrible acids in the urine. There is a great decrease in available alkalies which, when extreme, may cause coma and death.

The two distinct causes of acidosis, starvation and anesthesia, when occurring at the same time in the same patient, may produce such a degree of toxicity as to become alarming or even fatal. The minor degrees of acidosis are responsible for many cases of persistent postoperative vomiting.

In 1914, Opie and Alford published a paper in the Journal of the American Medical Association which gave the results of animal experiments conducted by them to determine the effect of diet upon animals poisoned by chloroform.

Three sets of white rats were taken, one set was fed for six days on oats and glucose, another on meat, and the third on fat, and at the end of that time each animal was given, hypodermatically, what was presumably the minimum fatal dose of chloroform. The experiments seemed to show quite conclusively that carbohydrates protect the body proteins from disintegration.

Many surgeons have, for some time, made a routine practice of giving soda and glucose solutions by mouth before operation, and per rectum during operation or in form of the Murphy drip following the operation. We have used these methods and believe that the excellent clinical results which have been reported are fully justified.

In the light of all the evidence available, however, it seems probable that the administration of alkalies only relieves the symptoms of acidosis, but it requires the absorption and oxidation of carbohydrates to prevent the excessive katabolism of fats and proteids.

* * *

In cases where mouth feeding is not contraindicated, carbohydrates should be administered as a routine to within three hours of beginning the anesthetic. Solutions of glucose are best suited for this purpose as they are readily absorbed and are not liable to cause intestinal fermentation.

There are, however, many surgical cases in which mouth feeding cannot be carried out for sometime prior to operation. For these cases it is of the greatest importance to know that glucose solution may be given either intravenously, subcutaneously or per rectum with excellent results.

There is at present much evidence to show the superiority of the subcutaneous use of glucose solution, and it seems definitely proven that when used in this manner it supplies energy to the cells, aids in tissue repair and diminishes acidosis.

Only a small percentage (2 to 5 per cent.) of the glucose injected subcutaneously finds its way into the urine. The calorimetric experiments of Vezar and Von Fejer prove that the remainder is burned in the body. As much as three liters representing 200 grams of glucose may be given hypodermatically during 24 hours. A 4½% solution in distilled water is isotonic, but a 5% solution is readily taken care of if given slowly.

In studying this matter in the light of the experimental work cited, and in connection with the findings of Kausch in 1911, we decided that if glucose solution was good before and after the operation it would probably be better during the administration of the anesthetic when the sugar was most needed in the blood to neutralize the toxic effect of the anesthetic. Hence we began using a 5% glucose solution by hypodermatoclysis during the operation, about ½ liter being put under each breast or into the loose tissues of the axilla. If given slowly with strict aseptic precautions, it will produce no more discomfort than normal salt solution given in the same manner.

We still use the pre and postoperative administration of glucose and soda but give the solution subcutaneously in addition, for we have demonstrated to our entire satisfaction the superiority of the results obtained by the subcutaneous method when administered during the anesthesia.

We have used this procedure as a routine for the past four years, using it in practically every major operation and are thoroughly convinced that the clinical results are excellent; in fact, aside from the lessened thirst, minimized nausea and absence of acidosis, we believe that in many weak, poorly nourished subjects of low vitality, it is actually life saving, and the most effective preventative of surgical shock yet devised.

EVOLUTION IN SURGICAL PRACTICE.

T. D. CROTHERS, M. D.,
HARTFORD, CONN.

In 1890 a leading metropolitan surgeon was called to trephine the skull, where a diagnosis of fracture and compression was made. The operation failed to confirm the diagnosis. The patient was a so-called moderate drinker, using spirits at meals daily. He was very active up to the time of the injury. The surgeon recommended alcohol as a stimulant to be given with great regularity and increased if the heart failed. Two physicians were in attendance, and the use of spirits together with other stimulants was kept up in increasing doses until his death, ten days later. The autopsy presented negative evidence concerning the cause of death. In 1916 an equally active man was thrown from a motor, striking on his head, producing contusions, and he was supposed to be suffering from fracture of the skull. An eminent New York surgeon was called to perform an operation. He declined, but ordered that all spirits should be withdrawn from the patient, who was a moderate drinker, and small doses of sulphate of magnesia, with active hydropathic measures, should be given. The family physician refused to take responsibility and the surgeon assumed it, sending a student from his office to carry out his directions. The patient recovered and became a total abstainer.

In a brown-stone mansion on Fifth Avenue a patient with a crushed knee-joint and fracture of both tibia and fibula was considered by the best surgeons as a fit case for amputation. This was done with skill and the failing heart was treated with brandy at short intervals. The most elaborate nursing and skillful therapeutic measures failed to prevent gangrene and death in a very short time. Last year a patient at his summer home sustained a severe fracture of the knee-joint and the femur. Two eminent surgeons replaced the fragments in the best antiseptic conditions and placed the patient under a tent near his summer home. He, too, was a moderate drinker. All spirits were withdrawn, the diet was restricted and hydrotherapeutic measures substituted. The best hygienic conditions were applied and in three months full recovery followed. The patient is attending to business with simply a stiff knee-joint. Cases like the following were common in the best circles of scientific medicine a few years ago. Obscure disorders of the stomach with anemia were treated with excessive feeding and the most nutritious foods, together with stimulants to sustain the heart, the mortality was always excessive, notwithstanding the most scientific nursing and care. Later many of these cases were treated by surgical explorations to determine the presence of tumors or other obstructions. Great emphasis was given to the study of the heart's action and stimulants were supposed to be the principal remedy. No matter what the original causes were, anemia and exhaustion seemed to call for scientific feeding, and elaborate food theories of what was essential were entertained and practised. Today in these obscure cases, wherever there is an alcoholic causation, or the history of drug taking, with or without the advice of the physician, the modern surgeon refuses to do anything until all stimulants and drugs are withdrawn, then if the patient has been a gourmand his starvation diet is called for. Surgeons find that the mortality following operations in any condition of life is greatly lessened when the patient is an abstainer from spirits and drugs. Operations must be carried on in pauper hospitals and elsewhere, without the attention to the possible habits of the patient, and yet the results are uncertain and doubtful when the patient's condition cannot be controlled.

A leading surgeon said to a wealthy patient, "The risk of a fatal operation is at least twenty per cent. greater than it would be if you would go home, give up all use of spirits and attend to careful dieting for a month." The patient was astonished, but followed the surgeon's advice. The era of excessive feeding with elaborate diets and combinations of spirits and milk has gone by. The modern surgeon, no matter what his diagnosis may be, always recognizes these obstacles and removes them if possible, before he attempts surgical interference. A very wealthy man endowed an elaborate hospital in Syria with a palatial building and every possible appliance for the most modern surgical work. A few years later he paid a visit to the hospital and found that the work was done outside under tents and trees, there were hardly any beds occupied in the hospital, the building was literally a chapel and meeting-room for those who were convalescing. The surgeons declared that the mortality in this building was high compared with the work done outside in the open air. This was the result of experience and not of theories. The surgeons found that antiseptic work and restricted diet with water as the chief remedy were followed by the most satisfactory recovery.

The surgical experience in France and Belgium bring out this fact in a most revolutionary way; amputations are growing less and less; even for surgical lesions, contused bones are adjusted, and the treatment conducted with especial reference to pre-

vent infection and to encourage healing. In plastic surgery of the face American physicians have astonished the European surgeons by their brilliant results. The text-books concerning the treatment of wounds written a few years ago are rapidly being superceded by new methods and the use of new means unrecognized before. In hemorrhage, particularly of the brain and internal organs, no spirits are used, but morphia in small doses is found to contribute the most practical means for recovery. The modern surgeon in private practice and even in hospitals is rapidly learning the essentials of recovery in the conditions, habits and surroundings of the patient. The routine work of a few years ago, with its fears of collapse, fears from intercurrent diseases of exposure and many real or imaginary causes is receding, and the American surgeon from all others is rapidly learning the great facts that his art is only an aid to nature and that a great variety of other causes, than that he is called to remove must be recognized. He is also learning how far the mind of the patient influences the progress or suppression of the disease, and how essential conditions of toxemias, anemias and other conditions must be considered in the problem of cure.

TECHNIQUE OF WIRING CORRESPONDING TEETH OF SUPERIOR AND INFERIOR MAXILLA IN FRACTURE OF INFERIOR MAXILLA.

EDMUND BUTLER, M. D.
SAN FRANCISCO.

The diagnosis should be confirmed by radiographs as a double fracture is sometimes present unsuspected.

Have the patient on an ordinary warm dressing or operating table of medium height so that access may be had from all directions.

The mouth is cleansed by irrigating with a weak peroxide of hydrogen solution followed by sterile water. Clots of food may be loosened with a wooden applicator mounted with cotton. Any attempt to brush or scrape the teeth will cause the patient great discomfort and is not warranted.

If the patient is excitable and not easily controlled anesthesia is required. Gas-and-oxygen is preferable but must be administered by an expert anesthetist. Ether by the open drop method is satisfactory if an expert anesthetist familiar with gas-and-oyxgen cannot be had. When anesthesia is used be certain that the stomach contains no food before fixing the teeth. The vomiting of mucus and bile with the teeth fixed is not dangerous, but the vomiting of food may be extremely dangerous.

Reduce the fracture, judging the results of your efforts by the occlusion of the teeth. If a tooth is loose in the line of fracture and prevents correction of the position of the fragments, remove it. It is not often that a tooth has to be removed. When the occlusion is correct select the teeth to be wired, usually the first molars on the sound side, the lateral incisors, anterior to the line of fracture and the first sound tooth posterior to the line of fracture, on the fractured side. The jaws are now separated again. If the fracture line is posterior to the teeth in the region of the angle of the jaw, the inclusion of the first molars on both sides is sufficient as the tension of the muscles keep the fragments in position after the body of the jaw is immobilized. When the fracture is double it is often very difficult to select the teeth that tend to maintain correct occlusion, and only individual judgment will map out a correct procedure in these extreme cases.

Six centimeter length of copper wire, No. 26 or smaller, are cut from a spool such as is used by an electrician. The teeth of the superior maxilla are prepared first. The first upper molar is taken, for example. Retract the cheek gently with finger or small Parker retractor, slip the end of the wire through the distal interdental space, with a curved hemostatic clamp direct the wire around the lingual surface and out through the proximal interdental space. Now grasp each end with a clamp and twist the protruding wire ends, the first twist fixing the wire around the body of the tooth, and continue to twist until approximately six twists are made, the remaining twists falling into space distally. If the two ends are grasped in one clamp and twisted the tension from torsion snaps the wire before it clinches on the tooth. The wire must be proximal to the shoulder of the tooth and take the shape of its circumference. If these details are fulfilled the wires do not slip and future adjustments are not needed.

The remaining selected teeth of the superior maxilla and the corresponding teeth of the inferior maxilla are now prepared as described above. Every movement must be profitable when working on the teeth of the inferior maxilla as manipulation is extremely painful. Having the wires in place, force the inferior jaw into position of correct occlusion, twist or hook wires of the corresponding teeth together, cut off superfluous portions, turn the rough ends against the teeth and guard each with dental wax or rubber.

With the jaws fixed in position the patient be-

comes comfortable and any further adjustment, as tightening the wires, is not painful. If the wires are properly applied no adjustment from day to day is necessary. The patient is nourished by crushed, scraped and liquid food forced through a catheter passed posterior to the last molar or through the space of an absent tooth. If unable to use the corresponding teeth, an oblique position of the wires is not detrimental as long as the obliquity is in the direction which prevents the deformity from reforming. The wires may be removed from the fourteenth to the twenty-first day; the longer period is advisable unless their removal is deemed judicious before.

A SIMPLE OPERATION FOR RETROVERSION OF THE UTERUS.

A. N. BESSESEN, M. D.,
MINNEAPOLIS, MINN.

Retroversion of the uterus is a frequent cause of pelvic disorder in women. When found at operation it should be corrected. Otherwise the patient may not obtain the full relief expected, although other seemingly more important defects are attended to.

Too often a mild or even excessive retroversion is left after simply bringing the uterus forward and dropping the intestines into the pelvic cavity. Dr. Edward Oschner claims that even a normal uterus should be held in proper position by a temporary ventral suspension, after a laparotomy. Why, then, is this condition so often allowed to remain? Possibly because no operation yet devised fulfils the requirement. Relapses are so frequent as to be discouraging. More than one hundred methods and variations of methods have been devised to overcome this defect. Some of the operations suggested are so complicated that while otherwise desirable they take so much time and skill that any minor excuse may prevent their performance. Other operations depend on the production of abnormalities that in themselves preclude their more general use. Many of the operations are done on the thickened part of the round ligament near the uterine end and so tend further to weaken the natural support and must necessarily result in a relapse of the retroversion.

The method that I wish to present was worked out by me some three years ago. I have demonstrated it to a number of surgeons and all have so far approved of its logic. In the few cases that I have operated upon and have been able to follow up there has been no relapse of the retroversion.

I find that E. C. Dudley described a somewhat similar operation in the *American Journal of the Medical Science,* June, 1906. I can therefore claim for my operation only that it is a modification of Dudley's.

Dudley's technic is as follows: "Traction being made on the ligament in order to locate its point of entrance at the internal ring, an ordinary needle is introduced at this point and the round ligament and the adjacent parts of the broad ligament are caught up from point to point until the suture finally is brought out in the uterine tissue near the uterine end of the round ligament. The tying of the suture, which should not be drawn too tightly, shortens and strengthens the ligament by crumpling it on itself. If the ligament is absent or highly attenuated the structure of the broad ligament between the horn of the uterus and the internal ligament may be brought together by a similar suture with similar results. Before tying the suture the surfaces should be scarified in order to secure strong union."

In my modification of Dudley's operation I do not carry the suture to the horn of the uterus, but prefer to start with the needle at a point about one-half to one inch distal to the uterus, passing the needle through the round ligament and then from point to point to its exit at the internal ring, there the needle is made to take a bite through the tissues at the ring, and is returned in like manner to the point of starting. The opposite side is treated in the same way. When the operator draws taut the suture of the one side and an assistant draws taut the suture of the opposite side it is easily determined how much tension will be required to bring the uterus into the corrected or, better, slightly over-corrected position. The sutures are then tied. If desired a shortening of the utero-sacral ligaments can also be performed to give added security.

By this method we avoid the long strand of ligature that must necessarily be exposed when the suture is tied in the Dudley operation. If the two extremes are drawn into opposition we produce not so much a crumpling of the ligament as a bending or doubling of the ligament on itself, in a manner to form an irregular circle, thus practically eliminating the round ligament as a factor in the support of the uterus.

The operation that I suggest retains the strongest part of the ligament to functionate. The thinner outer part is crumpled on itself in such manner that it also is made thicker and of equal strength with the uterine end of the round ligament.

The advantages that I claim for the operation are, in the first place, that it cannot primarily fail. One is perfectly certain of finding the round liga-

ments and of shortening them to any required degree. Second, the uterus is left in its normal position and supported by its round ligaments in a natural way. There are no loops or holes for the intestines to enter and cause trouble. Should pregnancy occur the uterus is left free to move and rise as may be required. By the use of non-absorbent suture material the result is likely to be permanent. The only way failure could happen would be through cutting out of the sutures, and that will not happen if care is taken in tying them. The operation is easy to perform, and can be done quickly, even when a shortening of the utero-sacral ligaments is done at the same time.

This operation is especially advantageous in patients who have not passed the menopause and who are in fairly good physical condition, with tissues sufficiently firm to hold by suture.

I should like to hear from other surgeons their experiences with this procedure.

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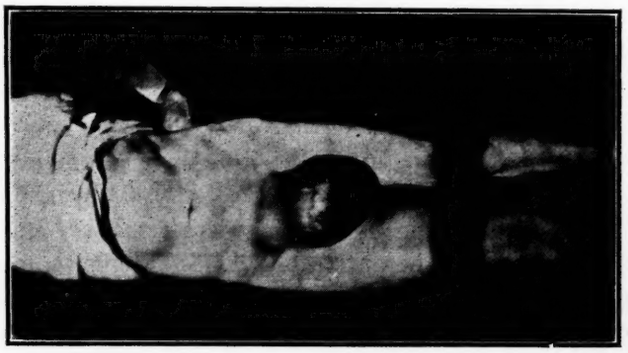
AN UNUSUALLY LARGE SARCOMA OF THE TESTICLE.*

WALTER A. FANSLER, M. D.,
MINNEAPOLIS.

This case is a striking example of the need of public education concerning malignant disease. The public should be told over and over again that any lump or unusual enlargement or discharge should be investigated at once, and that malignant tumors are *usually* painless in the early stages.

The patient was a male, age fifty, a foreman in a planing mill, family history negative. Ten years ago he was kicked on the right testicle by a horse. The testicle swelled at that time to about twice normal size, but after a few weeks returned to what he considered normal. Since that time the testicle had frequently become tender and a little swollen, but never enough to keep him from work. About one year ago it started to progressively enlarge, and three months ago was the size of his fist. The past three months the growth has been much more rapid, and at the time he presented himself for examination, the size of the mass was 16x17 cm. as measured with a pelvimeter. The accompanying cut shows the relative size. The skin over the mass was tense, red and shining, but was movable. The superficial vessels were dilated. The mass had completely usurped the right of domicile, the penis showing as a dimple. The tumor was in its greater part hard and firm, but there were several areas that suggested fluid. The scrotal mass was almost round, but a projection could be felt, extending up into the right iliac region, apparently through the abdominal ring. The right leg was twice the size of the left, due to edema. No separate lymph nodes and masses in the abdomen could be palpated. The left testicle was normal in size and easily palpated. The patient said he suffered no pain whatever, and it was simply the size of the mass and the swelling of the leg which prevented anything but limited locomotion that had brought him to the doctor. He said he thought he had a hernia, and was wearing a truss. He was told that the chances of cure were practically *nil,* but he wanted what slight chance there was, and the ability to walk with greater freedom, so the mass was removed as completely as possibly. Grossly the tumor mass was found to consist of rather vascular, friable tissue for the most part, which contained cystic and degenerating areas. Microscopically it was found to be a sarcoma of a rapidly growing type as was shown by the many mitotic figures and multiple mitoses.



The wound healed readily and the edema of the right leg lessened very markedly. After operation he was immediately started on graduated treatments with X-rays and Coley's fluid to the point of tolerance. A small tumor mass quickly appeared in the right iliac region and increased in size in spite of these measures, and the patient left the hospital in about five weeks with a considerable mass in the right lower abdomen, but he did not complain of pain at any time. The patient was last seen on December 20th, two months and one week from date of operation, at which time the mass in the abdomen extended to the midline and almost to the umbilicus. The edema of the leg was again marked. He still had practically no pain. We were unable to get further report of him, but of the termination there is no doubt.

100 Andrus Bldg.

*From the Clinic of Dr. F. A. Dunsmoor.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, JANUARY, 1918.

THE DEVELOPMENT OF NEW HOSPITALS.

The functions of health departments vary according to the willingness of the public to meet the costs and according to the degree of public sentiment and knowledge, necessary to properly appreciate the need for the control of health hazards. According to the *Public Health Reports,* December 7th, 1917, the appropriations for health departments in the United States vary almost directly with the size of the community and, in general, are insufficient for the proper functioning of these departments.

The annual per capita expenditure for health averages from nine cents in communities of 5,000 or under to thirty-nine cents in cities of 100,000 or 300,000 population.

At this time when numerous health problems are arising by reason of war time conditions, it is essential that public health administration be advanced as rapidly as possible. The necessity for establishing civil sanitary districts around the National Army cantonments has been recognized. The lack of adequate sanitary, laboratory and hospital facilities for rural health work has been repeatedly emphasized. The value of cooperative efforts to insure the reduction of sickness and death from preventable diseases is more significant during a state of war than during times of peace.

The maintenance of the health of the civil and industrial population and the restoration of the afflicted promptly to a state of physical wellbeing without the loss of efficiency demand the extension of hospital facilities as rapidly as funds can be made available. In the government plans for the care of disabled returned soldiers, provision is being made for general military hospitals with auxiliary hospitals as required, together with special institutions for the treatment of nervous and mental diseases, diseases of the heart and lungs, and orthopedic defects. The specific need for the proper management and redemption of men injured in military and naval service indicates the importance of similar hospital organization for the great mass of people upon whom the burden of war must fall even though they are not honored by a uniform or title.

The formulation of a definite policy for municipalities deserves consideration while the entire subject of hospital care is under discussion by the highest authorities in the national service.

The time for meagre appropriations, poorly paid, untrained and unskilled health officers has passed. Police and fire protection are appreciated at their full value but the wants of communities along lines designed to secure the physical wellbeing of citizens has not been evaluated according to the returns to the community.

Hospitals are not merely institutions for the care of the sick and for providing facilities for surgeons and technically trained specialists. They represent vast social agencies for the promotion of the aconomic and social welfare of those who are afflicted but more particularly for the complete advancement of the community. Unfortunately hospitals have been regarded as charities. The idea of charity in hospital care must be relegated to the background and due appreciation must be given to the fact that the hospital represents a constructive systematic attempt of society to afford rightful protection to the members of a community against conditions for which community life is more responsible than the personal shortcomings of individuals.

The therapeutic aspects of surgery merit interpretation in terms of economics. The disabled soldier, whether in military or civil life, possesses a decreased value. The function of the hospital involves the reclamation of patients to the maximum degree of social effectiveness. Hospitals for the care of the tuberculous, the venereally diseased, the orthopedically handicapped, the mentally unbalanced will increase in number in direct proportion to the intelligent understanding of their necessity and economic purpose.

The extent to which modern armies depend upon the loyal cooperation of the medical profession demonstrates advantages to be secured through trained workers. The basis of medical organization is the hospital. The consciousness of the importance of hospital care is slowly dawning upon the body politic. As a result the hospital movement in this country will grow with rapidity. Hospital expansion will be a measure, not of the charity of the nation, but of its knowledge, understanding, and appreciation, of the worth of hospitals as conservers of the human vital assets which disease and accident attempt to sacrifice. I. S. W.

AIDING THE DEPENDENTS OF SOLDIERS AND SAILORS:

There has recently been organized, in New York City, a committee to look after the medical and surgical needs of soldier's and sailor's dependents. This is distinctly not a charity—as the word is so unfortunately misunderstood—but a method of doing something that it were better if it were not necessary to do. Many of the men who have gone to the front have left their families provided to meet the ordinary contingencies but their necessarily reduced incomes will not stand the strain imposed by a lengthy illness. It is inconceivable to the writer how any physician who for physical or other considerations is unable to offer himself to the government could fail to respond to a call from such a source, willingly and freely. The almost unanimous affirmative answer given by those already approached is sufficient evidence of the sense of duty of the medical profession.

While it is understood that the doctor is the first and, so far as a hasty survey of our economic state shows, practically the only one who gives, and literally the only one who is expected under all circumstances to give other than a moiety of his surplus to his fellow, and while his is an enviable distinction in a hard and materialistic society and one which the writer would not want to relinquish, it would seem, meet at this time that others should join with him. The traditional altruist should not lead the van and be the procession as well. Would it be impossible, for this once for the landlord, the butcher, the baker to give a little too? Of course the time honored—shall we say excuse—will be advanced that what the doctor gives costs him no actual outlay of money. Still the rent of the soldier's or sailor's family could be reduced; his children could be fed at cost or at a reduced profit and a patriotic duty would be done equal to any rate, to that of free handed giving to badly managed—or sadly impoverished funds.—L. G. K.

Book Reviews

Surgical Clinics of Chicago. October, 1917. Vol. 1, No. 5, with 84 illustrations. Philadelphia and London: W. B. SAUNDERS Co., 1917.

This number contains a number of very fine clinical talks. One very unique case is described by Dr. Malcolm L. Harris of the Henrotin Memorial Hospital. In a young girl of fifteen years a swelling developed in one breast which was shown to be due to the escape of the glandular part of the breast into the subcutaneous tissue through a large opening or rather deficiency of the fascia which normally encloses it. The deformity was corrected by circumscribing the opening with a circular suture which was then tightened. A good result is recorded.

Books Received

Elements of Hygiene and Public Health. By CHARLES PORTER, M.D., B.Sc., M.R.C.P. (Edin.), of The Middle Temple, Barrister-at-Law; Medical Officer of Health, Metropolitan Borough of St. Marylebone; Examiner in Public Health, University of Edinburgh; Member of Board of Examiners, Royal Sanitary Institute and Sanitary Inspectors' Examination Board; Author of "Sanitary Law and Practice" (with Dr. William Robertson). Duodecimo; 411 pages; 81 illustrations. London: HENRY FROWDE-HODDER & STOUGHTON, 1917. $4.15.

Medical Research and Human Welfare. By W. W. KEEN, M.D., LL.D. (Brown), Emeritus Professor of Surgery, Jefferson Medical College, Philadelphia. Duodecimo; 160 pages; illustrated. Boston and New York: HOUGHTON MIFFLIN COMPANY, 1917. $1.25.

A Text-Book of Bacteriology. By PHILIP HANSON HISS, JR., M.D., Late Professor of Bacteriology, College of Physicians and Surgeons, Columbia University, New York City; and HANS ZINSSER, M.D., Professor of Bacteriology, College of Physicians and Surgeons, Columbia University, New York City, Bacteriologist to the Presbyterian Hospital, Formerly Professor of Bacteriology and Immunity. Stanford University, California. *Third edition.* Small octavo; 769 pages; 155 illustrations. New York and London: D. APPLETON & COMPANY, 1917.

Practical Bacteriology, Blood Work and Animal Parasitology. By E. R. STITT, A.B., Ph.G., M.D., Medical Director, U. S. Navy; Graduate, London School of Tropical Medicine; Professor of Tropical Medicine, Georgetown University; Lecturer in Tropical Medicine, Jefferson Medical College; Formerly Associate Professor of Medical Zoology, University of the the Philippines. *Fourth edition.* Duodecimo; 497 pages; illustrated. Philadelphia: P. BLAKISTON'S SON & Co., 1916. $2.00.

Diseases of Women. By HARRY STURGEON CROSSEN, M.D., F.A.C.S., Associate in Gynecology, Washington University Medical School, and Associate Gynecologist to the Barnes Hospital; Gynecologist to St. Luke's Hospital, Missouri Baptist Sanitarium and St. Louis Mullanphy Hospital. *Fourth Edition.* Large octavo; 1160 pages; 800 illustrations. St. Louis: C. V. MOSBY COMPANY, 1917.

Preventive Medicines and Hygiene. By MILTON J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard; Director of the School for Health Officers of Harvard University and the Massachusetts Institute of Technology; formerly Director of the Hygienic Laboratory, U. S. Public Health Service, etc. With chapters upon Sewage and Garbage, by GEORGE

C. WHIPPLE, Professor of Sanitary Engineering, Harvard; Vital Statistics, by JOHN W. TRASK, Assistant Surgeon-General, U. S. Public Health Service; Mental Hygiene, by THOMAS W. SALMON, Medical Director, National Committee for Mental Hygiene, etc. *Third Edition.* Large Octavo; 1374 pages; illustrated. New York and London: D. APPLETON & COMPANY, 1917.

Diagnostic and Therapeutic Technic. A Manual of Practical Procedures in Diagnosis and Treatment. By Albert S. Morrow, A.B., M.D., Clinical Professor of Surgery, N. Y. Polyclinic, etc. *Second Edition.* Large octavo; 834 pages; 860 illustrations. Philadelphia and London: W. B. SAUNDERS Co., 1917. $5.50.

Handbook of Anatomy. BY JAMES K. YOUNG, M.D., F.A.C.S., Professor of Orthopedic Surgery, Philadelphia Polyclinic; Orthopedic Surgeon to the Philadelphia General Hospital; Fellow of the College of Physicians, of Philadelphia; Fellow of the Philadelphia Academy of Surgery; Fellow of the American Orthopedic Association, etc. *Fifth Edition.* Duodecimo; 435 pages; 154 illustrations. Philadelphia: F. A. DAVIS COMPANY, 1917. $2.00.

Surgery and Diseases of the Mouth and Jaws. A Practical Treatise on the Surgery and Diseases of the Mouth and Allied Structures. By VILRAY PAPIN BLAIR, A.M., M.D., F.A.C.S., Professor of Oral Surgery, Washington University Dental School; Associate in Surgery, Washington University Medical School. *Third Edition.* Revised to incorporate the latest war data concerning gunshot injuries of the face and jaws. Compiled by the Section of Surgery of the Head, Subsection of Plastic and Oral Surgery, Office of the Surgeon General of the Army. Octavo; 733 pages; 460 illustrations. St. Louis: C. V. MOSBY Co., 1917. $6.00.

Physical Diagnosis. By W. D. ROSE, M.D., Lecturer on Physical Diagnosis and Associate Professor of Medicine in the Medical Department of the University of Arkansas. Octavo; 499 pages; 294 illustrations. St. Louis: C. V. MOSBY Co., 1917. $4.00.

Chirurgie de Duerre. Chirurgie D' Urgence. Chirurgie Deparatrice et Orthopedique. Par Le DR. MAUCLAIRE, Chirurgien de la Charité. Professeur agrégé a la Faculté de Medicine de Paris, Chirurgien-chef de plusieurs ambulances. Octavo; 532 pages; 316 figures. Paris: LIBRAIRIE J. B. BAILLIÈRE ET FILS, 1918.

A Dietary Computer. By AMY ELIZABETH POPE, Formerly Instructor in the School of Nursing, Presbyterian Hospital; Instructor in the School of Nursing, St. Luke's Hospital, San Francisco, Cal. Author of "A Medical Dictionary for Nurses," and, with Anna C. Maxwell, of "Practical Nursing." Duodecimo; 170 pages. New York and London: G. P. PUTNAM'S SONS, 1917.

Talks on Obstetrics. By RAE THORNTON LA VAKE, M.D., Instructor in Obstetrics and Gynecology, University of Minnesota; Associate Attending Obstetrician and Gynecologist to the Minneapolis City Hospital; Obstetrican-in-Charge of the Out-Patient Obstetric Department of the Wells Memorial Dispensary; Obstetrician to the Swedish and Abbott Hospitals, Minneapolis; One Time Assistant Resident Obstetrician to the Sloane Hospital for Women in New York. Duodecimo 157 pages. St. Louis: C. V. MOSBY Co., 1917. $1.00.

The Treatment of Emergencies. By HUBLEY R. OWENS, M.D., Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases; Chief Surgeon to the Philadelphia Police and Fire Bureaus; Assistant Surgeon, Medical Reserve Corps, U. S. Navy. 350 pages; 249 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1917. Cloth, $2.00, net.

Physiological Chemistry. By C. J. V. PETTIBONE, Ph.D., Assistant Professor of Physiological Chemistry, Medical School, University of Minnesota, Minneapolis. Duodecimo; 328 pages. St. Louis: C. V. MOSBY Co., 1917, $2.50.

Food Preparedness for the United States. By CHARLES O'BRIEN. Duodecimo; 118 pages. Boston: LITTLE, BROWN & COMPANY, 1917.

Physical Exercises for Invalids and Convalescents. By EDWARD H. OCHSNER, B.S., M.D., F.A.C.S. President, Illinois State Charities Commission; Attending Surgeon, Augustana Hospital, Chicago. Duodecimo; 54 pages; 40 illustrations. St. Louis: C. V. MOSBY COMPANY, 1917.

A Handbook of Antiseptics. By HENRY DRYSDALE DAKIN, D.Sc., F.I.C., F.R.S., and EDWARD KELLOGG DUNHAM, M.D., Emeritus Professor of Pathology, University and Bellevue Hospital Medical College; Major, Medical Officers Reserve Corps, U. S. Army. Duodecimo; 128 pages. New York: THE MACMILLAN COMPANY, 1917. $1.25.

Progress in Surgery

A Résumé of Recent Literature.

Wounds of the Knee-Joint. SIR BERKELEY MOYNIHAN, Leeds. *Boston Medical and Surgical Journal,* November 22, 1917.

1. In all cases of wounds of the knee-joint, the limb should be fixed immovably upon a splint at the earliest possible moment, and until circumstances and surroundings permit of a complete operation.

2. At the casualty clearing station, or other operating center, an x-ray examination is made in all cases. The whole limb is then prepared for operation.

3. The following are the essential features in all operations; excision of the wounds and of the track of the projectile after preliminary sterilization by the cautery or otherwise; a free exposure of the joint either by enlarging existing incisions or by long internal or external incisions or by the formation of a flap by division of the patellar ligament.

4. All foreign bodies must be removed from the joint. Even the smallest piece of clothing or of metal may be the nidus of a continuing infection.

5. The wounds are closed in layers by catgut sutures. Drainage is secured by leaving a gap in the line of suture of the synovial membrane, or by leaving a tube close "down to but not into" the joint.

6. Drainage tubes are never placed within the joint cavity. They do not drain the joint, they are harmful in their effects upon the delicate synovial membrane, and they are often a channel by means of which infection is conducted to the joint.

7. In cases of severe infection of the joint by staphylococcus, or especially by the streptococcus, the wounds must be reopened, the synovial membrane stitched to the skin, free drainage of the joint secured, and the Carrel-Dakin or other method of progressive sterilization of the wound adopted. In more severe cases, with an infection rapidly gaining ground, excision of the joint may be necessary.

8. In cases of severe comminution of the articular ends with much loss of substance (the whole of one condyle, for example), a resection of the joint is performed forthwith.

9. In severe and extensive wounds with heavy infection, the method of resection with wide, temporary separation of the ends of the bones (Fullerton) should be practiced.

10. In cases of very extensive damage, especially with infection amputation is desirable.

Subperiosteal Fissure Fractures of the Tibia in Children. S. KLEINBERG. *The American Journal of Orthopedic Surgery*, November, 1907.

The chief characteristics of this type of fracture are as follows: (1) It occurs in children. (2) It involves only the tibia. (3) There is moderate swelling of the leg. (4) There is a definite linear tenderness. (5) There is persistent linear tenderness. (6) Discoloration is very circumscribed and is often absent. (7) It results probably from a twist of the leg. (8) It runs the ordinary course and heals in 4 to 6 weeks. (9) From the facts available it is thought to be periosteal. (10) It looks like and is most often mistaken for a contusion.

A Method for Efficient Drainage of the Knee-Joint. A. W. MAYO-ROBSON. *British Medical Journal*, October 6, 1917.

With the limb in the usual dorsal position, the deepest part of the synovial cavity is in front of the popliteal space, much below the level of the suprapatellar pouch. Drainage is at present practically always effected by inserting a tube or tubes into the pouch above the patella, leaving much of the septic contents of the joint behind and between the femur and tibia with a tendency to make a way for itself to the surface by burrowing backwards into the popliteal space or along the course of the tendons in that region, upwards into the thigh, and downwards into the leg, or in both directions.

By changing the position of the limb, it is possible to make a suprapatellar pouch the dependent part of the joint, when by the very simple operation of inserting a tube into the top of the pouch the whole joint can be completely evacuated and purified, and if this is done sufficiently early, a speedy recovery may be anticipated with the joints mobility unimpaired.

Two changes of position will make the suprapatellar pouch dependent:

(*a*) The vertical position of the limb at right angles to the body with the patient in the dorsal decubitus, or
(*b*) The prone position of the body with the foot of the bed well raised.

In both positions the limb must be efficiently fixed on a splint, as fixation in inflammation of the knee-joint is only second in importance to drainage.

When once the joint has been thoroughly evacuated of its septic contents, and if needful gently washed out with warm normal saline solution, the synovial membrane of the knee, like the peritoneum, is capable of taking care of itself. Long-continued drainage is very seldom required, and usually a movable joint will be obtained.

Screw Fixation in Joint Fractures. ASTLEY P. C. ASHHURST, Philadelphia. *Medicine and Surgery*, October, 1917.

The author details his expeience with Lambotte's method of screw fixation of the fragments in joint fractures which are not susceptible to bloodless methods of fixation. The results have been excellent. The screws never gave any trouble.

The Rectangular Flap Incision for Operations Within the Upper Abdomen. WILLY MEYER, New York. *Journal of the American Medical Association*, November 17, 1917.

The transverse incision has the advantage of making it mainly through the fascia and the more natural tendency to closure of the wound. It has the disadvantage, however, of making it more difficult when the transverse incision alone is employed to expose all the organs that are desired. The writer has found a turn downward of the right extremity of the incision within the rectus muscle useful in upper abdominal operations. There are two methods of this exposure. The first is the method of Koenig and Kehr by which the incision goes through all the tissues of the abdominal wall, turning them up in the form of a rectangular flap, and the second is the method of Perthes, who makes a rectangular skin muscle flap including skin and subcutaneous fat plus the anterior sheath of the rectus muscle and a portion of its belly in the line of the skin incision. Meanwhile the transversalis muscle and the transversalis fascia with a posterior sheath of the rectus which is, in part at least, made up by the united aponeuroses of the transversalis muscle and posterior lamella of the aponeurosis of the oblique—plus peritoneum, are incised in the oblique direction parallel to and in front of the costal arch. This preserves intact the intercostal nerves which supply the muscle substance of the rectus. The advantages of each procedure are given in detail and the writer's personal experience is described. He has employed the Koenig-Kehr through-and-through cut on three different occasions. In two cases, at least, it was made necessary by an accident or by conditions making the other method impracticable. The typical Perthes' incision has been done in twenty-two cases. In one case choledocholithotomy with subsequent hepaticus drainage had to be carried out, and in two it was employed as a useful entrance for exploration with added appendectomy. Once a subhepatic abscess, consecutive to a duodenal ulcer, was found. While this experience is not very extensive, it has convinced the writer of the advantages of the rectangular methods, which represent a valuable addition to our operative resources. The surgeon will act wisely if he becomes thoroughly acquainted with all methods that have been found to be of value and are adapted to certain conditions.

Obscure Tarsal and Malleolus Fractures. WILLIAM PEARCE COUES, Boston. *Medicine and Surgery*, October, 1917.

Tarsal and other injuries about the ankle are frequently obscure and when there is a question of confusion from rare anatomical variants it is necessary to take radiographs of the uninjured foot as well. Careful clinical examination and a definite diagnosis should be attempted before radiographs are taken. The clinical signs that usually make the surgeon suspicious are usually well marked. Treating these fractures as sprains may cause later deformity, pain and weakness of the foot and excessive callus, as pointed out by Ross and Stewart. Subperiosteal and "sprain-fractures" of the external malleolus are quite often treated as sprained ankles.

Role de la Plicature Intestinale dans Les Lesions Chroniques du Colon Ascendant et de l'Ampoule Caecale. (The role of intestinal plication in chronic lesions of the ascending colon and of the cecal pouch.) Dr. G. A. CASALIS DE PURY. *Paris Medicale*, October 27, 1917.

The anatomy, pathology and pathogenesis of the condition which in England and America is usually called Jackson's veils or Lane's kinks is described and the method of surgical treatment made use of by the author is indicated. This includes the liberation of the adhesions found by appropriate incisions, an appendicectomy and a plication of the ascending colon along a line parallel with the longitudinal striæ. The results were very interesting and gave the author great satisfaction.

A Statistical Study of the Causes of Abortion. G. D. ROYSTON, *American Journal of Obstetrics*. October, 1917.

Royston studied in detail 164 patients who had a history of abortion, out of a total of 563 patients examined. He found in his study that more than 20 per cent, probably over 25 per cent of all abortions are induced. Sixty per cent of all induced abortions result in more or less permanent sterility. Dangers resulting from induced abortion are worst in the case of the midwife, next the patient and last by the physician. A positive Wasserman reaction is obtainable in about 25 per cent of all women who have aborted. Less than one-third of the syphilitic women give any history or show any physical signs indicative of the disease. This is most apt to be detected by routine Wasserman examination. Syphilis interrupts pregnancy at any and all periods of gestation. Syphilitic women abort in more than 60 per cent of their pregnancies. Renal deficiency interrupts pregnancy only in the event of renal decompensation as evidenced by definite concomitant symptoms. Pregnancy may be interrupted as a result of renal insufficiency at any period of gestation. 65 to 90 per cent of all women who have aborted will show some pathologic lesion in the genitalia.

A Case of Double Obliquely Contracted Pelvis (Roberts), Associated With Acute Lumbar Lordosis Due to an Infantile Paralysis in Early Childhood. E. M. LAZARD, *American Journal of Obstetrics.* October, 1917.

This was a negress thirty-nine years old, principara at time when first seen by Lazard. The patient had evidently had infantile paralysis at the age of six since when she was not able to stand erect but walked on all fours. The patient had been in hard labor for seven hours. A highly contracted pelvis with a decided inclination was rapidly discovered by examination. A Caesarian section resulted in the birth of a live child. The uterus was removed because of the presence of numerous fibroids. The patient made a good recovery.

A Study of Chloroform, Ether and Nitrous Oxid-Oxygen in Pregnancy and Labor. C. HENRY DAVIS, *American Journal of Obstetrics.* October, 1917.

After comparing the toxic effects of chloroform, ether and nitrous oxid upon mother and fetus, Davis concludes that in the hands of most obstetricians, nitrous oxid-oxygen has proved itself the most valuable analgesic for labor. This is particularly true of the painful second stage of labor when ether is less satisfactory but more desirable than chloroform. For early in labor, the author uses, if an analgesic is required, either an opiate alone or with chloral hydrate or scopolamin.

Nitrous-Oxid Analgesia in Obstetrics: A Study of 476 Cases. W. C. DANFORTH, *American Journal of Obstetrics.* October, 1917.

Danforth's general conclusion is that his experience has been for the great part satisfactory in the use of nitrous oxid analgesia in obstetrics. It may, however, not be used for a period exceeding three hours. It should be given at the beginning of each pain, not uninterruptedly. But the gas should be started *immediately* at the onset of a pain. Good results cannot be obtained if the pain is allowed to get well under way before inhalation is started. Cyanosis must and can be avoided. If the baby is born cyanotic allow the mother to inhale pure oxygen for a few breaths before tying the cord. The technic of administration of the gas must be mastered for ideal results to be obtained.

The Differential Diagnosis of Right Renal and Gall-bladder Lithiasis. LEWIS GREGORY COLE, *Interstate Medical Journal,* October, 1917.

In differentiating between these two kinds of calculi the following criteria are of help:

1. The shadow of a renal stone is much smaller and more clearly defined with the plate posterior and the tube anterior. When the position of plate and tube is reversed, a biliary calculus is smaller and more clearly defined.

2. Stereoscopically renal calculi appear in a posterior plane near the vertebral column, while biliary stones appear in an anterior plane above or below the costal arch.

3. If two plates are made with a lateral shift of the tube between the two, altered relations between the stone and the kidney of gall-bladder shadow may readily make a differentiation possible.

4. A plate made with the patient on his right side will show gall-stones in an anterior and renal stones in a posterior plane.

5. The proximity of the stones to the anterior or posterior walls can be shown by any of the standard methods of foreign body localization.

6. Pyleography or ureteral catheterization serve as accurate methods for renal localization; gastrography for gall-bladder localization.

The Fourth Venereal Disease—Erosive and Gangrenous Balanitis. ROBERT G. OWEN, and FLOYD A. MARTIN, *The Journal of Laboratory and Clinical Medicine.* September, 1917.

Corbus was the first to draw attention to this very typical infection. He believed the condition to be quite common, and conceived the disease to be a distinct clinical entity. Bacteriologically, smears from the discharge shows fusiform bacilli or vibrios or spirochete forms; these are Gram-positive and have no motility. The organism is a strict anaerobe.

Symptomotology: The disease usually begins as small superficial erosions on the penis. These may heal within a few days, or may coalesce. The characteristic symptom of this type of venereal sore is the early and profuse yellow pus of foul odor. The lymph nodes are enlarged and painless. As a rule, there are no constitutional symptoms. As the disease is caused by an anaerobe, it is best to expose the sore to air. Hydrogen peroxide acts as a specific. For the gangrenous type, salvarsan may be necessary.

The Significance of Tubercle Bacilli in the Urine. WILLIAM M. SPITZER, WILLIAM WHITRIDGE WILLIAMS, WARD BURDICK and J. P. CRANEY, Denver. *Interstate Medical Journal,* October, 1917.

The following conclusions seem justifiable to the authors: Tubercle bacilli in the urine in a tuberculous patient indicate a tuberculous lesion somewhere in the genito-urinary tract and the patient should be kept under observation until the exact location is found. Since an early diagnosis is of the greatest importance it is advised that urinary sediment of all tuberculous patients be injected into guinea-pigs as a matter of routine. The distressing symptoms due to bladder infection can be prevented by an early diagnosis of tuberculosis of the kidneys, preferably made before the bladder becomes involved. This is possible by the methods outlined in the paper.

Goiter. An Analysis of 125 Cases with a Note on the Treatment. LEIGH F. WATSON, Chicago. *N. Y. Medical Journal,* September 22, 1917.

Watson reviews the records of 125 goiter cases considering the cause, age at onset, and effect of previous operations in certain cases. He illustrates by tables the degree of enlargement, and reports the results following quinin and urea injection.

In 43 per cent. no exciting cause could be elicited; in the remaining 57 per cent. the onset could be ascribed to a definite exciting cause. Of the 125 cases, 15 per cent. was caused by worry; parturition was responsible for 11 per cent., and in 9 per cent. the condition was due to puberty. Twenty per cent. gave a family history of goiter and 11 per cent. of nervousness; 19 per cent. had had tonsillitis. Forty-five per cent. of the exophthalmic patients first noted the goiter eight years before examination at the average age of 34 years, and the symptoms developed at the age of 40. Fifty per cent. gave a history of acute onset, two years before coming under observation at the average age of 29 years. Sixty per cent. of the non-exophthalmic patients observed that they developed more marked symptoms of intoxication as the goiter became more chronic.

Before coming under treatment, five exophthalmic patients had had ligation of the superior thyroid arteries with temporary relief; four had had partial thyroidectomies without permanent benefit; three had had pelvic operations without lessening the hyperthyroidism; the condition of one was aggravated by a panhysterectomy; and one had had a tonsillectomy six months before without influencing the severity of the exophthalmic symptoms. Enlargement usually begins in the right lobe, sometimes in the isthmus and least frequently in the left lobe. In 95 per cent. of the exophthalmic patients of this group both lobes and isthmus were involved before the goiter became exophthalmic. A majority of the patients noticed increasing symptoms of intoxication as the goiter became more chronic, gradually involving both lobes and isthmus. Eighteen per cent. of the mildly toxic patients became exophthalmic after an average period of five years. This study indicates that both non-toxic and toxic goiter occur later in life in nongoitrous localities than in sections where the disease is more prevalent.

The following tables show the results after quinin and urea injections:

Effect of the Injection of Symptoms.	*Relieved.*	*Improved.*	*Not Imp.*
Exophthalmic	85 (aver. 4 mos.)	15	0
Nonexophthalmic	84 (aver. 2 mos.)	10	6

Effect of the Injections on Goiter.	*Cured*	*Reduced.*	*Not Red.*
Exophthalmic	80 (aver. 5 mos.)	15	5
Nonexophthalmic	75 (aver. 4 mos.)	12	13

Two patients suffering with severe toxic goiter with exophthalmos of several years duration received only slight benefit; later a lobectomy was performed without additional relief. Four exophthalmic patients were pregnant two to four months. Relief from hyperthyroidism followed the injection and they went to term without recurrence and had normal deliveries. The number of patients cured is highest in the group of those who came for treatment early in the disease; the benefit received by those who came later was in proportion to the degree of damage done the circulatory and nervous systems. A goiter that once disappeared has never recurred. A majority of the patients in this group have been under observation for two to four years. The quinin and urea injection has limitations the same as any other treatment for goiter and can be employed only in selected cases. The treatment of the exophthalmic type in young adults is very difficult, and should be attempted only under the most favorable circumstances. If the best results are to be secured hyperthyroidal patients must have at least a year of mental and physical rest after treatment.

The Prevention of Simple Goiter in Man. DAVID MARINE and O. P. KIMBALL. *The Journal of Laboratory and Clinical Medicine,* October, 1917.

Marine and Kimball state that simple goiter in animals is probably the easiest of all known diseases to prevent and that small doses of iodine protect animals against compensatory hyperplasia of the thyroid. Therefore, in a large group of school girls they administered iodine in exceedingly small doses. Out of 3,872 girls examined for thyroid enlargement only 43.59 per cent. were normal, this indicating the great incidence of thyroid changes occurring in school girls at puberty. To offset the possibility of thyrotoxic symptoms appearing in these children, the authors gave sodium iodide, 2 to 4 gms., over a period of a few weeks, administering 0.2 gms. daily. The treatment is given twice a year, in May and December.

The Clinical Symptoms and Treatment of Hypertrophy of the Thymus Gland. CHARLES GREENE CUMISTON, Geneva. *The Medical Press,* August 22, 1917.

The clinical signs are of two kinds, (1) functional, frequent paroxysms of suffocation, and (2) the physical signs including the radioscopy. Three distinct surgical methods have been essayed, viz., exothymectomy, resection of the sternal manubrium and thymectomy. Thymectomy is unquestionably the operation of choice and in order to avoid injury to the large vessels, pericardium or pleura, an intracapsular enucleation should be done. Partial thymectomy has been enough in many cases to cause the symptoms to subside. Sufficient experience has not been acquired along radiotherapeutic lines to enable one to speak with certainty of this method of treatment.

Post-Transfusion Reactions. A Review of 280 transfusions performed in Presbyterian Hospital, New York City. H. E. MELEVEY, W. S. STEARNS, S. T. FORTUNE and R. M. TERRY. *New York American Journal of Medical Science,* November, 1917.

1. Transfusion is of real value in cases of hemorrhage, in clean operative cases, in pernicious anemia, and in some secondary anemias. It is of little or no value in septic operative cases, cases of bacteriemia, or cases of acute leukemia.

2. The sodium citrate method of transfusion is a very simple and satisfactory method. A dilution of citrate up to 0.5 per cent. in 1000 c.c. of blood can be used without producing toxic symptoms in an adult, and that dilution prevents clotting better than a dilution of 0.2 per cent.

3. Blood grouping should always be carried out before a transfusion. Where a reliable laboratory is at hand the direct grouping of donor and recipient is not necessary, but otherwise should always be performed. Failure to determine the compatibility of the bloods may result in the sudden death of the patient.

4. Post-transfusion reactions occurred in 63.6 per cent. of the cases in our series, the reactions varying greatly in degree, but all being evidenced by a rise of temperature to 100° or more.

5. The recipient in good general condition is much more likely to have a reaction than the one in poor condition.

6. The method of transfusion, the blood relationship of donor and recipient, and the blood group of the recipient seem to have nothing to do with the ocurrence of the reaction.

7. Transfusions of small amounts of blood, *i. e.,* less than 200 c. c., are less likely to be followed by reactions than are transfusions of larger amounts.

8. The more transfusions a patient is given the more likely he is to have a reaction, especially if the same donor is used a large number of times. The blood of some donors is more likely to cause reactions than the blood of others.

9. In some cases the post-transfusion reaction is accompanied by a marked polymorphonuclear leukocytosis. Whether this is due to intravascular hemolysis or to the formation of a toxic product from the partial splitting of a foreign protein cannot at present be stated. It seems most likely, however, that one of these phenomena is probably responsible for most post-transfusion reactions.

Complications of Mastoiditis. D. H. BALLON, *The Canadian Medical Association Journal,* September, 1917.

The author treats briefly the intracranial complications that may 2follow otitic inflammations. These are (1) Extradural abscess. This is usually produced in virulent infections when the mastoid has but a thin plate of bone separating it from the cranium. Another form of the same condition is termed (2) Perisinus abscess. This in turn may be a precursor of (3) Lateral sinus thrombosis or (4) Brain abscess, which is usually, single, and confined most frequently in the temporosphenoidal lobe. (5) Cerebellar abscess. (6) Otitic meningitis. (7) Circumscribed labyrinthitis. (8) Cholesteatoma. (9) Otitic facial paralysis.

Ballon takes up the symptoms in each of these complications, points out the details of differential diagnosis and indicates the treatment.

Sinusitis as a Source of Systemic Infection. ALEXANDER S. ROCHESTER, Chicago. *International Journal of Surgery,* September, 1917.

The sinuses are one of the three most common seats for the establishment of foci of infection, the other two locations being the tonsils and gums. Of these three the sinuses are much less frequently the offender. The different types of sinusitis are acute and chronic catarrhal sinusitis and acute and chronic suppurative sinusitis. The last named is the form which gives rise to systemic infection and toxaemia.

Studies in Meningitis. A. LEVINSON, Chicago. *Illinois Medical Journal,* October, 1917.

Pneumococcus meningitis is not rare and usually follows middle ear infection. The exudate is mainly fibrinous and the cellular content of the fluid is mainly polynuclear leucocytes. The pneumococci are more numerous in smears than meningicocci in meningococcus meningitis. The prognosis is usually fatal. The treatment should include repeated intraspinal injections of antimeningococcus or normal horse serum.

Electricite Medicale et Reeducation Professionelle (Medical electricity and professional re-education). Dr. J. LARAT et Dr. A. BILLIARD. *Paris Medicale,* October 27, 1917.

The essential point brought out is that in the centers in France in which the wounded soldiers are cared for the re-education of disabled limbs or muscular groups is not carried out blindly. The cases are studied individually before being referred for mechano-therapy and it is possible to tell with considerable accuracy how much return to normal function can be expected. The most valuable aid both for diagnostic and therapeutic purposes is the electric current.